INDEX TO AUTHORS

A

ALKON, DANIEL L. A dual synaptic effect on hair cells in *Hermissenda*, 385
—. Neural correlates of associative training in *Hermissenda*, 46
ALVAREZ, OSVALDO, LATORRE, RAMON, and VERDUGO, PEDRO. Kinetic characteristics of the excitability-inducing material channel in oxidized cholesterol and brain lipid bilayer membranes, 421

B

BASTIAN, JOSEPH. See NAKAJIMA, NAKAJIMA, and BASTIAN, 459
BARLOW, ROBERT B., JR., and QUARLES, DONALD A., JR. Mach bands in the lateral eye of *Limulus*. Comparison of theory and experiment, 709
BARNOLA, FLOR V. See VILLEGAS, BARNOLA, and CAMEJO, 114
BONNER, ROBERT F., and CARLSON, F. D. Structural dynamics of frog muscle during isometric contraction, 555
BOZLER, EMIL. Mechanical control of the time-course of contraction of the frog heart, 329
BRINLEY, F. J., JR. See MULLINS and BRINLEY, 135

C

CAMEJO, GERMÁN. See VILLEGAS, BARNOLA, and CAMEJO, 114
CARLSON, F. D. See BONNER and CARLSON, 555
CEDAR, HOWARD. See SCHWARTZ, EISENSTADT, and CEDAR, 255
CHANGEUX, JEAN-PIERRE. See LESTER, CHANGEUX, and SHERIDAN, 797
CHAPPELL, RICHARD L., and DEVOE, ROBERT D. Action spectra and chromatic mechanisms of cells in the median ocelli of dragonflies, 399
CURRAN, PETER F. See WALTON, DELORENZO, CURRAN, and GREENGARD, 153

D

DEHAAN, ROBERT L., and FOZZARD, HARRY A. Membrane response to current pulses in spheroidal aggregates of embryonic heart cells, 207
DELORENZO, ROBERT J. See WALTON, DELORENZO, CURRAN, and GREENGARD, 153
DEVOE, ROBERT D. See CHAPPELL and DEVOE, 399
DOMINGUEZ, GRACIELA. See SCHOENBERG, DOMINGUEZ, and FOZZARD, 441
DOWLING, JOHN E. See GREEN, DOWLING, SIEGEL, and RIPPS, 483
DUDEK, F. E. See WITKOVSKY, DUDEK, and RIPPS, 119
DUGAS, MARCUS C. See FRIZZELL, DUGAS, and SCHULTZ, 769

E

EISENBERG, R. S. See MOBLEY, LEUNG, and EISENBERG, 97
EISENSTADT, MICHAEL L., and SCHWARTZ, JAMES H. Metabolism of acetylcholine in the nervous system of *Aplysia californica*. III. Studies of an identified cholinergic neuron, 293
—, TREISTMAN, STEVEN N., and SCHWARTZ, JAMES H. Metabolism of acetylcholine in the nervous system of *Aplysia californica*. II. Regional localization and characterization of choline uptake, 275
—. See SCHWARTZ, EISENSTADT, and CEDAR, 255

F

FAMBROUGH, DOUGLAS M. See RITCHIE and FAMBROUGH, 751
FINKELSTEIN, ALAN. See MARTY and FINKELSTEIN, 515
FINN, ARTHUR L. Action of ouabain on sodium transport in toad urinary bladder. Evidence for two pathways for sodium entry, 503
FISCHKOFF, STEVEN, and VANDERKOOI, J. M.

Oxygen diffusion in biological and artificial membranes determined by the fluorochrome pyrene, 663
FLEMSTRON, G. See SPENNEY, FLEMSTROM, SHOEMAKER, and SACHS, 645
FOZZARD, HARRY A. See DEHAAN and FOZZARD, 207
—. See GIBBONS and FOZZARD, 345, 367
—. See LEE and FOZZARD, 695
—. See SCHOENBERG, DOMINGUEZ, and FOZZARD, 441
FRIZZELL, RAYMOND A., DUGAS, MARCUS C., and SCHULTZ, STANLEY G. Sodium chloride transport by rabbit gallbladder. Direct evidence for a coupled NaCl influx process, 769

G

GIBBONS, W. R., and FOZZARD, HARRY A. Relationships between voltage and tension in sheep cardiac Purkinje fibers, 345
—, and —. Slow inward current and contraction of sheep cardiac Purkinje fibers, 367
GITELMAN, HILLEL J. See PARKER, GITELMAN, GLOSSON, and LEONARD, 84
GLOSSAN, PAULA S. See PARKER, GITELMAN, GLOSSAN, and LEONARD, 84
GOLDMAN, L. Pronase and models for the sodium conductance, 551
GREEN, DANIEL G., DOWLING, JOHN E., SIEGEL, IRWIN M., and RIPPS, HARRIS. Retinal mechanisms of visual adaptation in the skate, 483
GREENGARD, PAUL. See WALTON, DE-LORENZO, CURRAN, and GREENGARD, 153
GUNN, R. B., WIETH, J. O., and TOSTESON, D. C. Some effects of low pH on chloride exchange in human red blood cells, 731

H

HAGIWARA, SUSUMU, OZAWA, SEIJI, and SAND, OLAV. Voltage clamp analysis of two inward current mechanisms in the egg cell membrane of a starfish, 617
HOMSHER, EARL, RALL, JACK A., WALLNER, A., and RICCHIUTI, N. V. Energy liberation and chemical change in frog skeletal muscle during single isometric tetanic contractions, 1
HUBBARD, RUTH. See SPERLING and HUBBARD, 235

J

JACQUEZ, JOHN A. One-way fluxes of α-aminoisobutyric acid in Ehrlich ascites tumor cells. *Trans* effects and effects of sodium and potassium, 57
JOHNSON, EDWARD A. See LIEBERMAN, SAWANOBORI, KOOTSEY, and JOHNSON, 527

K

KOBATAKE, YONOSUKE. See UEDA, TERAYAMA, KURIHARA, and KOBATAKE, 223
KOOTSEY, J. MAILEN. See LIEBERMAN, SAWANOBORI, KOOTSEY, and JOHNSON, 527
KURIHARA, KENZO. See UEDA, TERAYAMA, KURIHARA, and KOBATAKE, 223
KUSTIN, KENNETH, LADD, KAYE V., and MCCLEOD, GUY C. Site and rate of vanadium assimilation in the tunicate *Ciona intestinalis*, 315

L

LADD, KAYE V. See KUSTIN, LADD, and MCCLEOD, 315
LATORRE, RAMON. See ALVAREZ, LATORRE, and VERDUGO, 421
LEE, CHIN OK, and FOZZARD, HARRY A. Activities of potassium and sodium ions in rabbit heart muscle, 695
LEONARD, DANIEL L. See PARKER, GITELMAN, GLOSSAN, and LEONARD, 84
LESTER, HENRY A., CHANGEUX, JEAN-PIERRE, and SHERIDAN, ROBERT E. Conductance increases produced by bath application of cholinergic agonists to *Electrophorus* electroplaques, 797
LEUNG, J. See MOBLEY, LEUNG, and EISENBERG, 97
LIEBERMAN, MELVYN, SAWANOBORI, TOHRU, KOOTSEY, J. MAILEN, and JOHNSON, EDWARD A. A synthetic strand of cardiac muscle. Its passive electrical properties, 527
LORD, ELIZABETH. See WHITE and LORD, 583

M

MANDEL, LAZARO J. Actions of external hypertonic urea, ADH, and theophylline on transcellular and extracellular solute permeabilities in frog skin, 599

MARTY, ALAIN, and FINKELSTEIN, ALAN. Pores formed in lipid bilayer membranes by nystatin. Differences in its one-sided and two-sided action, 515
MCCLEOD, GUY C. See KUSTIN, LADD, and MCLEOD, 315
MOBLEY, BERT A., LEUNG, J., and EISENBERG, R. S. Longitudinal impedance of single frog muscle fibers, 97
MULLINS, L. J., and BRINLEY, F. J., JR. Sensitivity of calcium efflux from squid axons to changes in membrane potential, 135

N

NAKAJIMA, SHIGEHIRO, NAKAJIMA, YASUKO, and BASTIAN, JOSEPH. Effects of sudden changes in external sodium concentration on twitch tension in isolated muscle fibers, 459
NAKAJIMA, YASUKO. See NAKAJIMA, NAKAJIMA, and BASTIAN, 459

O

O'CONNELL, ROBERT J. Olfactory receptor responses to sex pheromone components in the redbanded leafroller moth, 179
OZAWA, SEIJI. See HAGIWARA, OZAWA, and SAND, 617

P

PARKER, JOHN C., GITELMAN, HILLEL J., GLOSSON, PAULA S., and LEONARD, DANIEL L. Role of calcium in volume regulation by dog red blood cells, 84

Q

QUARLES, DONALD A., JR. See BARLOW and QUARLES, 709

R

RALL, JACK A. See HOMSHER, RALL, WALLNER, and RICCHIUTI, 1
RICCHIUTI, N. V. See HOMSHER, RALL, WALLNER, and RICCHIUTI, 1
RIPPS, HARRIS. See GREEN, DOWLING, SIEGEL, and RIPPS, 483
—. See WITKOVSKY, DUDEK, and RIPPS, 119
RITCHIE, AILEEN K., and FAMBROUGH, DOUGLAS M. Ionic properties of the acetylcholine receptor in cultured rat myotubes, 751

S

SACHS, G. See SPENNEY, FLEMSTROM, SHOEMAKER, and SACHS, 645
SAND, OLAV. See HAGIWARA, OZAWA, and SAND, 617
SAWANOBORI, TOHRU. See LIEBERMAN, SAWANOBORI, KOOTSEY, and JOHNSON, 527
SCHOENBERG, MARK, DOMINGUEZ, GRACIELA, and FOZZARD, HARRY A. Effect of diameter on membrane capacity and conductance of sheep cardiac Purkinje fibers, 441
SCHULTZ, STANLEY G. See FRIZZELL, DUGAS, and SCHULTZ, 769
SCHWARTZ, JAMES H., EISENSTADT, MICHAEL L., and CEDAR, HOWARD. Metabolism of acetylcholine in the nervous system of *Aplysia californica*. I. Source of choline and its uptake by intact nervous tissue, 255
—. See EISENSTADT and SCHWARTZ, 293
—. See EISENSTADT, TREISTMAN, and SCHWARTZ, 275
SHERIDAN, ROBERT E. See LESTER, CHANGEUX, and SHERIDAN, 797
SHOEMAKER, R. L. See SPENNEY, FLEMSTROM, SHOEMAKER, and SACHS, 645
SIEGEL, IRWIN M. See GREEN, DOWLING, SIEGEL, and RIPPS, 483
SOLOMON, A. K. See SWANSON and SOLOMON, 22
SPENNEY, J. G., FLEMSTROM, G., SHOEMAKER, R. L., and SACHS, G. Quanatitation of conductance pathways in antral gastric mucosa, 645
SPERLING, LINDA, and HUBBARD, RUTH. Squid retinochrome, 235
SWANSON, C. H., and SOLOMON, A. K. Micropuncture analysis of the cellular mechanisms of electrolyte secretion by the vitro rabbit pancreas, 22

T

TARASKEVICH, P. STEPHEN. Dual effect of L-glutamate on excitatory postjunctional membranes of crayfish muscle, 677
TERAYAMA, KAZUYUKI. See UEDA, TERAYAMA, KURIHARA, and KOBATAKE, 223
TOSTESON, D. C. See GUNN, WIETH, and TOSTESON, 731
TREISTMAN, STEVEN N. See EISENSTADT, TREISTMAN, and SCHWARTZ, 275

U

UEDA, TETSUO, TERAYAMA, KAZUYUKI, KURIHARA, KENZO, and KOBATAKE, YONOSUKE. Threshold phenomena in chemoreception and taxis in slime mold *Physarum polycephalum*, 223

V

VANDERKOOI, J. M. See FISCHKOFF and VANDERKOOI, 663

VERDUGO, PEDRO. See ALVAREZ, LATORRE, and VERDUGO, 421

VILLEGAS, RAIMUNDO, BARNOLA, FLOR V., and CAMEJO, GERMÁN. On the interaction of tetrodotoxin with cholesterol monolayers, 114

W

WALLNER, A. See HOMSHER, RALL, WALLNER, and RICCHIUTI, 1

WALTON, KENNETH G., DELORENZO, ROBERT J., CURRAN, PETER F., and GREENGARD, PAUL. Regulation of protein phosphorylation and sodium transport in toad bladder, 153

WHITE, RICHARD H., and LORD, ELIZABETH. Diminution and enlargement of the mosquito rhabdom in light and darkness, 583

WIETH, J. O. See GUNN, WIETH, and TOSTESON, 731

WITKOVSKY, PAUL, DUDEK, F. E., and RIPPS, HARRIS. Slow PIII component of the carp electroretinogram, 119

INDEX TO SUBJECTS

A

Acetylcholine in the nervous system of *Aplysia californica*, metabolism of, source of choline and its uptake by intact nervous tissue, 255

— in nervous system of *Aplysia californica*, metabolism of, studies of an identified cholinergic neuron, 293

— in nervous system of *Aplysia californica*, regional localization and characterization of choline uptake, 275

— receptor in cultured rat myotubes, ionic properties of, 751

Acid, α-aminoisobutyric, one-way fluxes of, in Ehrlich ascites tumor cells, *trans* effects and effects of sodium and potassium, 57

Adaptation, visual, in the skate, retinal mechanisms of, 483

Aggregates of embryonic heart cells, spheroidal, membrane response to current pulses in, 207

Agonists, cholinergic, conductance increases produced by bath application of, to *Electrophorus* electroplaques, 797

α-Aminoisobutyric acid, one-way fluxes of, in Ehrlich ascites tumor cells, *trans* effects and effects of sodium and potassium, 57

Antral gastric mucosa, quantitation of conductance pathways in, 645

Aplysia californica, metabolism of acetylcholine in nervous system of, regional localization and characterization of choline uptake, 275

—, metabolism of acetylcholine in nervous system of, source of choline and its uptake by intact nervous tissue, 255

—, metabolism of acetylcholine in nervous system of, studies of an identified cholinergic neuron, 293

Ascites tumor cells, Ehrlich, one-way fluxes of α-aminoisobutyric acid in, *trans* effects and effects of sodium and potassium, 57

Assimilation, vanadium, site and rate of, in tunicate *Ciona intestinalis*, 315

Associative training in *Hermissenda*, neural correlates of, 46

Axons, squid, sensitivity of calcium efflux from, to changes in membrane potential, 135

B

Bands, Mach, in lateral eye of *Limulus*, comparison of theory and experiment, 709

Bilayer membranes, brain lipid, and oxidized cholesterol, kinetic characteristics of excitability-inducing material channel in, 421

— membranes, lipid, pores formed in, by nystatin, differences in its one-sided and two-sided action, 515

Bladder, toad, regulation of protein phosphorylation and sodium transport in, 153

—, toad urinary, action of ouabain on sodium transport in, evidence for two pathways for sodium entry, 503

Blood cells, red. *See* Erythrocytes.

Brain lipid bilayer membranes and oxidized cholesterol, kinetic characteristics of excitability-inducing material channel in, 421

C

Calcium efflux from squid axons, sensitivity of, to changes in membrane potential, 135

—, role of, in volume regulation by dog red blood cells, 84

Cardiac muscle, synthetic strand of, its passive electrical properties, 527

— Purkinje fibers, sheep, effect of diameter on membrane capacity and conductance of, 441

— Purkinje fibers, sheep, relationships between voltage and tension in, 345

— Purkinje fibers, sheep, slow inward current and contraction of, 367

Cell membrane, egg, of starfish, voltage

clamp analysis of two inward current mechanisms in, 617
Cells, Ehrlich ascites tumor, one-way fluxes of α-aminoisobutyric acid in, *trans* effects and effects of sodium and potassium, 57
—, embryonic heart, membrane response to current pulses in spheroidal aggregates of, 207
—, hair, dual synaptic effect on, in *Hermissenda*, 385
— in median ocelli of dragonflies, action spectra and chromatic mechanisms of, 399
—, red blood. *See* Erythrocytes.
Cellular mechanisms of electrolyte secretion by in vitro rabbit pancreas, micropuncture analysis of, 22
Channel, excitability-inducing material, in oxidized cholesterol and brain lipid bilayer membranes, kinetic characteristics of, 421
Chemoreception and taxis in slime mold *Physarum polycephalum*, threshold phenomena in, 223
Chloride exchange in human red blood cells, some effects of low pH on, 731
—, sodium, transport by rabbit gallbladder, direct evidence for coupled NaCl influx process, 769
Cholesterol monolayers, on the interaction of tetrodotoxin with, 114
—, oxidized, and brain lipid bilayer membranes, kinetic characteristics of excitability-inducing material channel in, 421
Choline, source of, and its uptake by intact nervous tissue, metabolism of acetylcholine in nervous system of *Aplysia californica*, 255
— uptake, regional localization and characterization of, metabolism of acetylcholine in nervous system of *Aplysia californica*, 275
Cholinergic agonists, conductance increases produced by bath application of, to *Electrophorus* electroplaques, 797
— neuron, identified, studies of, metabolism of acetylcholine in nervous system of *Aplysia californica*, 293
Chromatic mechanisms and action spectra of cells in median ocelli of dragonflies, 399
Ciona intestinalis, tunicate, site and rate of vanadium assimilation in, 315
Clamp, voltage, analysis of two inward current mechanisms in egg cell membrane of starfish, 617
Conductance increases produced by bath application of cholinergic agonists to *Electrophorus* electroplaques, 797
—, membrane, and capacity of sheep cardiac Purkinje fibers, effect of diameter on, 441
— pathways in antral gastric mucosa, quantitation of, 645
—, sodium, Pronase and models for, 551
Contraction of frog heart, mechanical control of time-course of, 329
—, isometric, structural dynamics of frog muscle during, 555
— and slow inward current of sheep cardiac Purkinje fibers, 367
Contractions, single isometric tetanic, energy liberation and chemical change in frog skeletal muscle during, 1
Correlates, neural, of associative training in *Hermissenda*, 46
Coupled NaCl influx process, direct evidence for, sodium chloride transport by rabbit gallbladder, 769
Cultured rat myotubes, ionic properties of acetylcholine receptor in, 751

D

Dynamics, structural, of frog muscle during isometric contraction, 555

E

Efflux, calcium, from squid axons, sensitivity of, to changes in membrane potential, 135
Egg cell membrane of starfish, voltage clamp analysis of two inward current mechanisms in, 617
Ehrlich ascites tumor cells, one-way fluxes of α-aminoisobutyric acid in, *trans* effects and effects of sodium and potassium, 57
Electrolyte secretion by in vitro rabbit pancreas, micropuncture analysis of cellular mechanisms of, 22
Electrophorus electroplaques, conductance increases produced by bath application of cholinergic agonists to, 797
Electroplaques, *Electrophorus*, conductance increases produced by bath application of cholinergic agonists to, 797
Electroretinogram, carp, slow PIII component of, 119
Embryonic heart cells, spheroidal aggregates of, membrane response to current pulses in, 207
Energy liberation and chemical change in

frog skeletal muscle during single isometric tetanic contractions, 1
Erythrocytes, dog, role of calcium in volume regulation by, 84
—, human, some effects of low pH on chloride exchange in, 731
Exchange, chloride, in human red blood cells, some effects of low pH on, 731
Excitability-inducing material channel in oxidized cholesterol and brain lipid bilayer membranes, kinetic characteristics of, 421
Excitatory postjunctional membranes of crayfish muscle, dual effect of L-glutamate on, 677
External hypertonic urea, ADH, and theophylline, actions of, on transcellular and extracellular solute permeabilities in frog skin, 599
— sodium concentration, effects of sudden changes in, on twitch tension in isolated muscle fibers, 459
Extracellular and transcellular solute permeabilities in frog skin, actions of external hypertonic urea, ADH, and theophylline on, 599
Eye of *Limulus*, lateral, Mach bands in, comparison of theory and experiment, 709

F

Fibers, isolated muscle, effects of sudden changes in external sodium concentration on twitch tension in, 459
—, sheep cardiac Purkinje, effect of diameter on membrane capacity and conductance of, 441
—, sheep cardiac Purkinje, relationships between voltage and tension in, 345
—, sheep cardiac Purkinje, slow inward current and contraction of, 367
—, single frog muscle, longitudinal impedance of, 97
Fluorochrome pyrene, oxygen diffusion in biological and artificial membranes determined by, 663

G

Gallbladder, rabbit, sodium chloride transport by, direct evidence for coupled NaCl influx process, 769
Gastric mucosa, antral, quantitation of conductance pathways in, 645
L-Glutamate, dual effect of, on excitatory postjunctional membranes of crayfish muscle, 677

H

Hair cells in *Hermissenda*, dual synaptic effect on, 385
Heart cells, embryonic, membrane response to current pulses in spheroidal aggregates of, 207
—, frog, mechanical control of time-course of contractions of, 329
— muscle, rabbit, activities of potassium and sodium ions in, 695
Hermissenda, dual synaptic effect on hair cells in, 385
—, neural correlates of associative training in, 46
Hydrogen ion, low, some effects of, on chloride exchange in human red blood cells, 731
Hypertonic urea, external ADH, and theophylline, actions of, on transcellular and extracellular solute permeabilities in frog skin, 599

I

Impedance, longitudinal, of single frog muscle fibers, 97
Influx process, coupled, direct evidence for, sodium chloride transport by rabbit gallbladder, 769
Isobutyric acid, α-amino-, one-way fluxes of, in Ehrlich ascites tumor cells, *trans* effects and effects of sodium and potassium, 57
Isometric contraction, structural dynamics of frog muscle during, 555

L

Liberation, energy, and chemical change in frog skeletal muscle during single isometric tetanic contractions, 1
Limulus, Mach bands in lateral eye of, comparison of theory and experiment, 709
Lipid bilayer membranes, brain, and oxidized cholesterol, kinetic characteristics of excitability-inducing material channel in, 421
— bilayer membranes, pores formed in, by nystatin, differences in its one-sided and two-sided action, 515
Longitudinal impedance of single frog muscle fibers, 97

M

Mach bands in lateral eye of *Limulus*, comparison of theory and experiment, 709

Man, red blood cells, some effects of low pH on chloride exchange in, 731
Mechanisms, cellular, of electrolyte secretion by in vitro rabbit pancreas, micropuncture analysis of, 22
—, chromatic, and action spectra of cells in median ocelli of dragonflies, 399
—, retinal, of visual adaptation in the skate, 483
—, two inward current, in egg cell membrane of starfish, voltage clamp analysis of, 617
Median ocelli of dragonflies, action spectra and chromatic mechanisms of cells in, 399
Membrane capacity and conductance of sheep cardiac Purkinje fibers, effect of diameter on, 441
—, egg cell, of starfish, voltage clamp analysis of two inward current mechanisms in, 617
— potential, sensitivity of calcium efflux from squid axons to changes in, 135
— response to current pulses in spheroidal aggregates of embryonic heart cells, 207
Membranes, biological and artificial, oxygen diffusion in, determined by fluorochrome pyrene, 663
—, brain lipid bilayer, and oxidized cholesterol, kinetic characteristics of excitability-inducing material channel in, 421
—, excitatory postjunctional, of crayfish muscle, dual effects of L-glutamate on, 677
—, lipid bilayer, pores formed in, by nystatin, differences in its one-sided and two-sided action, 515
Metabolism of acetylcholine in nervous system of *Aplysia californica*, regional localization and characterization of choline uptake, 275
— of acetylcholine in nervous system of *Aplysia californica*, source of choline and its uptake by intact nervous tissue, 255
— of acetylcholine in nervous system of *Aplysia californica*, studies of an identified cholinergic neuron, 293
Micropuncture analysis of the cellular mechanisms of electrolyte secretion by in vitro rabbit pancreas, 22
Models for sodium conductance and Pronase, 551
Mold, slime, *Physarum polycephalum*, threshold phenomena in chemoreception and taxis in, 223
Monolayers, cholesterol, on the interaction of tetrodotoxin with, 114
Mucosa, antral gastric, quantitation of conductance pathways in, 645
Muscle, cardiac, synthetic strand of, its passive electrical properties, 527
—, crayfish, dual effect of L-glutamate on excitatory postjunctional membranes of, 677
— fibers, isolated, effects of sudden changes in external sodium concentration on twitch tension in, 459
— fibers, single frog, longitudinal impedance of, 97
—, frog skeletal, energy liberation and chemical change in, during single isometric tetanic contractions, 1
—, frog, structural dynamics of, during isometric contraction, 555
—, rabbit heart, activities of potassium and sodium ions in, 695
Myotubes, cultured rat, ionic properties of acetylcholine receptor in, 751

N

Nervous system of *Aplysia californica*, metabolism of acetylcholine in, regional localization and characterization of choline uptake, 275
— system of *Aplysia californica*, metabolism of acetylcholine in, source of choline and its uptake by intact nervous tissue, 255
— system of *Aplysia californica*, metabolism of acetylcholine in, studies of an identified cholinergic neuron, 293
— tissue, intact, source of choline and its uptake by, metabolism of acetylcholine in nervous system of *Aplysia californica*, 255
Neural correlates of associative training in *Hermissenda*, 46
Neuron, an identified cholinergic, studies of, metabolism of acetylcholine in nervous system of *Aplysia californica*, 293
Nystatin, pores formed in lipid bilayer membranes by, differences in its one-sided and two-sided action, 515

O

Ocelli, median, of dragonfiies, action spectra and chromatic mechanisms of cells in, 399
Olfactory receptor responses to sex phero-

mone components in redbanded leafroller moth, 179
Ouabain, action of, on sodium transport in toad urinary bladder, evidence for two pathways for sodium entry, 503
Oxidized cholesterol and brain lipid bilayer membranes, kinetic characteristics of excitability-inducing material channel in, 421
Oxygen diffusion in biological and artificial membranes determined by fluorochrome pyrene, 663

P

PIII component, slow, of the carp electroretinogram, 119
Pancreas, in vitro rabbit, micropuncture analysis of cellular mechanisms of electrolyte secretion by, 22
Permeabilities in frog skin, transcellular and extracellular solute, actions of external hypertonic urea, ADH, and theophylline on, 599
Pheromone components, sex, in the redbanded leafroller moth, olfactory receptor responses to, 179
Phosphorylation, protein, and sodium transport in toad bladder, regulation of, 153
Physarum polycephalum, slime mold, threshold phenomena in chemoreception and taxis in, 223
Pores formed in lipid bilayer membranes by nystatin, differences in its one-sided and two-sided action, 515
Postjunctional membranes of crayfish muscle, excitatory, dual effect on L-glutamate on, 677
Potassium and sodium ions, activities of, in rabbit heart muscle, 695
— and sodium, *trans* effects and effects of, one-way fluxes of α-aminoisobutyric acid in Ehrlich ascites tumor cells, 57
Pronase and models for sodium conductance, 551
Protein phosphorylation and sodium transport in toad bladder, regulation of, 153
Purkinje fibers, sheep cardiac, effect of diameter on membrane capacity and conductance of, 441
— fibers, sheep cardiac, relationships between voltage and tension in, 345
— fibers, sheep cardiac, slow inward current and contraction of, 367
Pyrene, fluorochrome, oxygen diffusion in biological and artificial membranes determined by, 663

R

Receptor, acetylcholine, in cultured rat myotubes, ionic properties of, 751
Red blood cells. *See* Erythrocytes.
Retinal mechanisms of visual adaptation in the skate, 483
Retinochrome, squid, 235
Rhabdom, mosquito, diminution and enlargement of, in light and darkness, 583

S

Secretion, electrolyte, by in vitro rabbit pancreas, micropuncture analysis of cellular mechanisms of, 22
Sensitivity of calcium efflux from squid axons to changes in membrane potential, 135
Sex pheromone components in redbanded leafroller moth, olfactory receptor responses to, 179
Skeletal muscle, frog, energy liberation and chemical change in, during single isometric tetanic contractions, 1
Skin, frog, actions of external hypertonic urea, ADH, and theophylline on transcellular and extracellular solute permeabilities in, 599
Slime mold *Physarum polycephalum*, threshold phenomena in chemoreception and taxis in, 223
Sodium chloride transport by rabbit gallbladder, direct evidence for coupled NaCl influx process, 769
— concentration, external, effects of sudden changes in, on twitch tension in isolated muscle fibers, 459
— conductance, Pronase and models for, 551
— and potassium ions, activities of, in rabbit heart muscle, 695
— and potassium, *trans* effects and effects of, one-way fluxes of α-aminoisobutyric acid in Ehrlich ascites tumor cells, 57
— transport and protein phosphorylation in toad bladder, regulation of, 153
— transport in toad urinary bladder, action of ouabain on, evidence for two pathways for sodium entry, 503
Solute permeabilities in frog skin, transcellular and extracellular, actions of

external hypertonic urea, ADH, and theophylline on, 599
Spectra, action, and chromatic mechanisms of cells in the median ocelli of dragonflies, 399
Spheroidal aggregates of embryonic heart cells, membrane response to current pulses in, 207
Synaptic effect, dual, on hair cells in *Hermissenda*, 385
Synthetic strand of cardiac muscle, its passive electrical properties, 527
System, nervous, of *Aplysia californica*, metabolism of acetylcholine in, regional localization and characterization of choline uptake, 275
—, nervous, of *Aplysia californica*, metabolism of acetylcholine in, source of choline and its uptake by intact nervous tissue, 255
—, nervous, of *Aplysia californica*, metabolism of acetylcholine in, studies of an identified cholinergic neuron, 293

T

Taxis and chemoreception in slime mold *Physarum polycephalum*, threshold phenomena in, 223
Tension and voltage, relationships between, in sheep cardiac Purkinje fibers, 345
Tension, twitch, in isolated muscle fibers, effects of sudden changes in external sodium concentration on, 459
Tetanic contractions, single isometric, energy liberation and chemical change in frog skeletal muscle during, 1
Tetrodotoxin, on the interaction of, with cholesterol monolayers, 114
Theophylline, external hypertonic urea, and ADH, actions of, on transcellular and extracellular solute permeabilities in frog skin, 599
Tissue, intact nervous, source of choline and its uptake by, metabolism of acetylcholine in nervous system of *Aplysia californica*, 255
Training in *Hermissenda*, associative, neural correlates of, 46
Trans effects and effects of sodium and potassium, one-way fluxes of α-aminoisobutyric acid in Ehrlich ascites tumor cells, 57
Transcellular and extracellular solute permeabilities in frog skin, actions of external hypertonic urea, ADH, and theophylline on, 599
Tumor cells, Ehrlich ascites, one-way fluxes of α-aminoisobutyric acid in, *trans* effects and effects of sodium and potassium, 57
Tunicate *Ciona intestinalis*, site and rate of vanadium assimilation in, 315
Twitch tension in isolated muscle fibers, effects of sudden changes in external sodium concentration on, 459

U

Uptake, choline, regional localization and characterization of, metabolism of acetylcholine in nervous system of *Aplysia californica*, 275
— of choline by intact nervous tissue and its source, metabolism of acetylcholine in the nervous system of *Aplysia californica*, 255
Urea, external hypertonic, ADH, and theophylline, actions of, on transcellular and extracellular solute permeabilities in frog skin, 599
Urinary bladder, toad, action of ouabain on sodium transport in, evidence for two pathways for sodium entry, 503

V

Vanadium assimilation in tunicate *Ciona intestinalis*, site and rate of, 315
Vasopressin (ADH), external hypertonic urea, and theophylline, actions of, on transcellular and extracellular solute permeabilities in frog skin, 599
Visual adaptations in the skate, retinal mechanisms of, 483
Volume regulation by dog red blood cells, role of calcium in, 84

CONTENTS

VOL

5

1975

MI

THE JOURNAL OF GENERAL PHYSIOLOGY

FOUNDED BY JACQUES LOEB

Honorary Editors

L. R. BLINKS DETLEV W. BRONK

JOHN H. NORTHROP

Editor

PAUL F. CRANEFIELD

Editorial Board

VINCENT ALLFREY
FRANCIS D. CARLSON
C. M. CONNELLY
PHILIP B. DUNHAM
ROBERT S. EISENBERG
BERTIL HILLE
PAUL HOROWICZ
WILLIAM P. HURLBUT
DAVID MAUZERALL
L. J. MULLINS
CARL PFAFFMANN
RICHARD J. PODOLSKY
FLOYD RATLIFF
ASER ROTHSTEIN
STANLEY G. SCHULTZ
A. K. SOLOMON
ANDREW G. SZENT-GYORGYI
ROGER C. THOMAS
ANNEMARIE WEBER
VICTOR J. WILSON

VOLUME 65 · THE JOURNAL OF GENERAL PHYSIOLOGY IS
THE OFFICIAL ORGAN OF THE SOCIETY OF GENERAL PHYSIOLOGISTS
AND IS EDITED IN COOPERATION WITH THE SOCIETY
TERESA WEINERT *Copyediting and Production*
THE ROCKEFELLER UNIVERSITY PRESS · NEW YORK 1975

COPYRIGHT © 1975 BY THE ROCKEFELLER UNIVERSITY PRESS

CONTENTS OF VOLUME 65

NUMBER 1, JANUARY, 1975

1 EARL HOMSHER, JACK A. RALL, A. WALLNER, and N. V. RICCHIUTI. Energy liberation and chemical change in frog skeletal muscle during single isometric tetanic contractions

22 C. H. SWANSON and A. K. SOLOMON. Micropuncture analysis of the cellular mechanisms of electrolyte secretion by the in vitro rabbit pancreas

46 DANIEL L. ALKON. Neural correlates of associative training in *Hermissenda*

57 JOHN A. JACQUEZ. One-way fluxes of α-aminoisobutyric acid in Ehrlich ascites tumor cells. *Trans* effects and effects of sodium and potassium

84 JOHN C. PARKER, HILLEL J. GITELMAN, PAULA S. GLOSSON, and DANIEL L. LEONARD. Role of calcium in volume regulation by dog red blood cells

97 BERT A. MOBLEY, J. LEUNG, and R. S. EISENBERG. Longitudinal impedance of single frog muscle fibers

114 LETTER TO THE EDITOR
RAIMUNDO VILLEGAS, FLOR V. BARNOLA, and GERMÁN CAMEJO. On the interaction of tetrodotoxin with cholesterol monolayers

NUMBER 2, FEBRUARY, 1975

119 PAUL WITKOVSKY, F. E. DUDEK, and HARRIS RIPPS. Slow PIII component of the carp electroretinogram

135 L. J. MULLINS and F. J. BRINLEY, JR. Sensitivity of calcium efflux from squid axons to changes in membrane potential

153 KENNETH G. WALTON, ROBERT J. DELORENZO, PETER F. CURRAN, and PAUL GREENGARD. Regulation of protein phosphorylation and sodium transport in toad bladder

179 ROBERT J. O'CONNELL. Olfactory receptor responses to sex pheromone components in the redbanded leafroller moth

207 ROBERT L. DEHAAN and HARRY A. FOZZARD. Membrane response to current pulses in spheroidal aggregates of embryonic heart cells

223 TETSUO UEDA, KAZUYUKI TERAYAMA, KENZO KURIHARA, and YONOSUKE KOBATAKE. Threshold phenomena in chemoreception and taxis in slime mold *Physarum polycephalum*

235 LINDA SPERLING and RUTH HUBBARD. Squid retinochrome

NUMBER 3, MARCH, 1975

255 JAMES H. SCHWARTZ, MICHAEL L. EISENSTADT, and HOWARD CEDAR. Metabolism of acetylcholine in the nervous system of *Aplysia californica*. I. Source of choline and its uptake by intact nervous tissue

275 MICHAEL L. EISENSTADT, STEVEN N. TREISTMAN, and JAMES H. SCHWARTZ.

Metabolism of acetylcholine in the nervous system of *Aplysia californica*. II. Regional localization and characterization of choline uptake

293 MICHAEL L. EISENSTADT and JAMES H. SCHWARTZ. Metabolism of acetylcholine in the nervous system of *Aplysia californica*. III. Studies of an identified cholinergic neuron

315 KENNETH KUSTIN, KAYE V. LADD, and GUY C. MCLEOD. Site and rate of vanadium assimilation in the tunicate *Ciona intestinalis*

329 EMIL BOZLER. Mechanical control of the time-course of contraction of the frog heart

345 W. R. GIBBONS and H. A. FOZZARD. Relationships between voltage and tension in sheep cardiac Purkinje fibers

367 W. R. GIBBONS and H. A. FOZZARD. Slow inward current and contraction of sheep cardiac Purkinje fibers

385 DANIEL L. ALKON. A dual synaptic effect on hair cells in *Hermissenda*

NUMBER 4, APRIL, 1975

399 RICHARD L. CHAPPELL and ROBERT DEVOE. Action spectra and chromatic mechanisms of cells in the median ocelli of dragonflies

421 OSVALDO ALVAREZ, RAMON LATORRE, and PEDRO VERDUGO. Kinetic characteristics of the excitability-inducing material channel in oxidized cholesterol and brain lipid bilayer membranes

441 MARK SCHOENBERG, GRACIELA DOMINGUEZ, and HARRY A. FOZZARD. Effect of diameter on membrane capacity and conductance of sheep cardiac Purkinje fibers

459 SHIGEHIRO NAKAJIMA, YASUKO NAKAJIMA, and JOSEPH BASTIAN. Effects of sudden changes in external sodium concentration on twitch tension in isolated muscle fibers

483 DANIEL G. GREEN, JOHN E. DOWLING, IRWIN M. SIEGEL, and HARRIS RIPPS. Retinal mechanisms of visual adaptation in the skate

503 ARTHUR L. FINN. Action of ouabain on sodium transport in toad urinary bladder. Evidence for two pathways for sodium entry

515 ALAIN MARTY and ALAN FINKELSTEIN. Pores formed in lipid bilayer membranes by nystatin. Differences in its one-sided and two-sided action.

527 MELVYN LIEBERMAN, TOHRU SAWANOBORI, J. MAILEN KOOTSEY, and EDWARD A. JOHNSON. A synthetic strand of cardiac muscle. Its passive electrical properties

551 LETTER TO THE EDITOR

L. GOLDMAN. Pronase and models for the sodium conductance

NUMBER 5, MAY, 1975

555 ROBERT F. BONNER and F. D. CARLSON. Structural dynamics of frog muscle during isometric contraction

583 RICHARD H. WHITE and ELIZABETH LORD. Diminution and enlargement of the mosquito rhabdom in light and darkness

599 LAZARO J. MANDEL. Actions of external hypertonic urea, ADH, and theo-

phylline on transcellular and extracellular solute permeabilities in frog skin

617 Susumu Hagiwara, Seiji Ozawa, and Olav Sand. Voltage clamp analysis of two inward current mechanisms in the egg cell membrane of a starfish

645 J. G. Spenney, G. Flemstrom, R. L. Shoemaker, and G. Sachs. Quantitation of conductance pathways in antral gastric mucosa

663 Steven Fischkoff and J. M. Vanderkooi. Oxygen diffusion in biological and artificial membranes determined by the fluorochrome pyrene

677 P. Stephen Taraskevich. Dual effect of L-glutamate on excitatory postjunctional membranes of crayfish muscle

NUMBER 6, JUNE, 1975

695 Chin Ok Lee and Harry A. Fozzard. Activities of potassium and sodium ions in rabbit heart muscle

709 Robert B. Barlow, Jr. and Donald A. Quarles, Jr. Mach bands in the lateral eye of *Limulus*. Comparison of theory and experiment

731 R. B. Gunn, J. O. Wieth, and D. C. Tosteson. Some effects of low pH on chloride exchange in human red blood cells

751 Aileen K. Ritchie and Douglas M. Fambrough. Ionic properties of the acetylcholine receptor in cultured rat myotubes

769 Raymond A. Frizzell, Marcus C. Dugas, and Stanley G. Schultz. Sodium chloride transport by rabbit gallbladder. Direct evidence for a coupled NaCl influx process

797 Henry A. Lester, Jean-Pierre Changeux, and Robert E. Sheridan. Conductance increases produced by bath application of cholinergic agonists to *Electrophorus* electroplaques

817 Indexes to Volume 65